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Measurements of the Effect of Adiabat on Shell Decompression in Direct-Drive Implosions on OMEGA D.T. MICHEL, S.X. HU, P.B. RADHA, A.K. DAVIS, R.S. CRAXTON, V.YU. GLEBOV, V.N. GONCHAROV, I.V. IGUMENSHCHEV, C. STOECKL, D.H. FROULA, Laboratory for Laser Energetics, U. of Rochester — Measurements of the effect of adiabat (α) on the shell thickness were performed in direct-drive implosions. The maximum in-flight shell thickness was obtained using a novel technique where the outer and inner surfaces of the shell were simultaneously measured using self-emission images of the imploding target. When reducing the shell's adiabat from $\alpha = 6$ to $\alpha = 4.5$, the shell thickness was measured to decrease from 75μm to 60μm, but when decreasing the adiabat further $(\alpha = 1.8)$, the shell thickness was measured to increase to 75μm. The measured shell thickness, shell trajectories, neutron bang time, and neutron yield were reproduced by two-dimensional simulations that include laser imprint, nonlocal thermal transport, cross-beam energy transfer, and first-principles equation-of-state models. These results show that the decompression of the shell measured for low-adiabat implosions was a result of laser imprint. Additional information on the evolution of the density profile was obtained using x-ray radiography. The backlighter was created with six of the 60 OMEGA laser beams, with the pointings and energies of other beams adjusted to maintain a uniform implosion. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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